



SALT MARSHES:

Restoring New Hampshire's Coastal

ANYONE WHO HAS VISITED the New Hampshire shore will know what a salt marsh looks like. Vast expanses of lush meadow threaded with meandering creeks. But salt marshes are more than beautiful. They are unique ecosystems that, when healthy, provide a number of beneficial functions to humans and wildlife.

Colonists early on recognized the value of these productive lands, relying on them as sources of hay to feed their cattle. But as agriculture declined, many people began to see salt marshes as little more than breeding grounds for mosquitoes and “greenhead” flies. Many thought the best use of a salt marsh was to drain it, fill it in and build on it.

Of an estimated 10,000 acres of salt marsh that existed in New Hampshire in colonial times, about 6,200 acres survive. Only a dozen years ago, much of what was left was not functioning properly and was being taken over by invasive plant species, like phragmites and purple loosestrife. The lifeblood of these salt marshes – the flow of tides twice a day – had been restricted by coastal roads, culverts or buried by dumped dredged spoils.

Robert Emro is a staff writer for Foster's Sunday Citizen in Dover.

Today, however, healthy salt marshes are recognized as vital fish habitat, an important element of flood control and a quintessential New England landscape. New Hampshire is leading the way in salt marsh restoration, benefiting wildlife, residents and visitors alike.

A COOPERATIVE EFFORT

The Granite State, with its compact 18-mile coastline, has restored more acres of wetland than any other coastal state in the Gulf of Maine, including Maine, Massachusetts and the Canadian provinces of Nova Scotia and New Brunswick.

“There was a real effort here – it wasn’t by accident. We really did that and it’s something the state can be proud of,” said Alan Ammann, Ph.D., a wildlife biologist with USDA’s Natural Resources Conservation Service in Durham. “In 1994, we looked at over 100 restrictions to tidal flows in the state. We identified dozens that could be corrected, which would help restore those salt marshes.”

In the past 12 years, the NRCS, in a cooperative effort with nearly a dozen local, state, federal agencies as well as



BY ROBERT EMRO

A COMPLEX ECOSYSTEM

New Hampshire's salt marshes are found along the state's 18-mile coastline, along the Piscataqua and Cocheco rivers, and around the Great Bay and Little Bay estuary and tributaries. These seemingly featureless meadows are complex ecosystems, delicately balanced between marine and terrestrial environments, and are one of the Northeast's primary grasslands.

Normal, healthy salt marshes are usually laced with tidal creeks that drain fresh water from the marshes and allow tidal water to be distributed throughout the wetlands. Their meadow-like appearance is dominated by salt-tolerant grasses, such as cordgrass.

New Hampshire has two basic kinds of salt marshes: low marshes and high marshes. Low marshes are usually the fringes along tidal creeks and estuaries that are flooded twice a day. A good example of a low marsh is Johnson Creek, upstream of Route 4 in Durham.

High marshes are usually inundated a few times every other week during spring tides or storm surges.

Areas around Rye Harbor and most of the Seabrook estuary are good examples of high marshes.

Throughout the high marsh are little areas called pannes, or intertidal pools, which hold water between the infrequent flooding tides and sometimes get very salty because of evaporation. Plants here include glasswort and widgeon grass, both eaten by

waterfowl. Pannes hold thousands of small bait fish and macroinvertebrates that birds eat.

IMPORTANT FUNCTIONS

A healthy salt marsh is one of the most productive ecosystems in the world, meaning it is very efficient at turning the sun's energy into plant life. As bacteria and small insects break down the vegetation, that energy becomes available to larger insects and small fish, like Atlantic silversides and mussels. These form the food supply for larger fish such as cod and flounder, which arrive with the tide.

Nationwide, more than two-thirds of commercially harvested fish are dependant at some point in their lives in salt marshes. So, restoring salt marshes is expected to help boost New England's depleted fish stocks.

Healthy salt marshes also help control mosquitoes, an increasing concern with the arrival in New Hampshire of the potentially deadly West Nile virus. Seacoast towns spend more than \$100,000 annually controlling mosquitoes. Ironically,

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A healthy salt marsh is an important habitat for egrets (above, left), great blue herons, sharp-tail sparrows, and many fish, including commercial species. Bringing salt marshes back to healthy, working condition usually involves restoring tidal flow. At Awcomin Marsh in Rye (above), tidal streams are being restored after being filled by dredge material in the 1940s and 1960s.



Restoring Awcomin Marsh in Rye (left) involves removing several feet of dredging muck and fixing tidal flow. Improved tidal flow will eventually kill invasive phragmites reed (below).



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past attempts to quash mosquito populations by draining salt marshes increased their numbers. The remaining pools of stagnant water could not support insect-eating fish like the mummichog minnow, but were perfect breeding habitat for the pesky biting bugs.

Healthy salt marshes also prevent shoreline erosion, protect uplands from storm surges, protect water quality, and offer a place for recreation and education.

But Ted Diers offers other good things about salt marshes. Diers is a planner with the N.H. Coastal Program. "The real reason we care about salt marshes is because they're integrally tied to the history and culture of the coast," Diers said. "If you go to Hampton, you see two things. You see the beach and that broad expanse of salt marsh and that marsh is beautiful."

road culverts or other restrictions cut off their connections with the tides.

The presence of invasive plants can indicate if a salt marsh is deteriorating. These include common reed (*Phragmites australis*), purple loosestrife or narrow leaf cattail. These plants have little value to wildlife and can crowd out the plants



that are valuable.

Leading efforts to unclog the drains and fix the marshes are the Natural Resources Conservation Service, Office of State Planning Coastal Program, U.N.H. Jackson Lab and a myriad of other partners, including state and federal agencies

and nonprofit organizations and local communities.

Two good examples of restoration efforts include Little River salt marsh in North Hampton and Awcomin Marsh in Rye.

Until last year, the 170-acre Little River salt marsh was drained by a single 48-inch diameter pipe. During heavy rains water would flood the marsh

— and nearby homes.

In October 1996, Chuck Gordon had only been in his North Hampton home on Little River Marsh about a year, having moved from Manhattan. In a period of 36 hours that month it

rained more than 11 inches, causing flooding of a magnitude expected only once every 500 years, on average. Six feet of water covered the marsh. The N.H. Department of Transportation had to dig an outlet to the sea

to prevent part of Route 1A from washing away.

"When a 500-year flood occurs in my lifetime, I don't consider it a 500-year flood," said Gordon. "The guest house had almost 4 feet of water in the basement and in the main house I had about a foot of water in the basement."

UNCLOGGING THE DRAINS

Things go wrong in salt marshes when they're filled in — that was the case at Awcomin Marsh in Rye in the 1940s and 1960s. Others stop functioning properly when



At Little River in North Hampton, the problem was a narrow 48-inch culvert (inset), which was replaced with two hefty box culverts.

BROAD SUPPORT

Gordon joined the town's conservation commission the following year and became involved in restoration

efforts. To restore tidal flow to the Little River Marsh, the 48-inch culvert was replaced with two 6 by 12-foot concrete box culverts. The work involved digging a 250-foot trench through Route 1A for the new culverts.

To illustrate the levels of support for salt marsh restoration, this \$1.2 million project was made possible by federal grants and contributions by the town of North Hampton, Ducks Unlimited, N.H. Department of Environmental Services, and N.H. Department of Transportation. Town residents contributed more than \$70,000. New Hampshire Fish and Game monitored the marsh to determine how successful the project was for fisheries and wildlife.

Impacts on wildlife were considered at every step. "When they did the dredging, they incorporated a few shallow pools to be nurseries for the fish," Gordon said.

IF YOU WANT TO GET INVOLVED WITH SALT MARSH RESTORATION EFFORTS, HERE ARE A FEW CONTACTS:

USDA Natural Resources
Conservation Service
(603) 868-7581

Rockingham County Conservation
District
(603) 679-2790

Strafford County Conservation
District
(603) 742-7430

Audubon Society of New Hampshire
(603) 224-9909

Office of State Planning, Coastal
Program
(603) 271-2155

Great Bay National Estuarine
Research Reserve
(603) 868-1095



Invasive phragmites, or common reed, crowds out salt marsh plants that help waterfowl and other species. When tidal flow is restored – like at as these re-dug creeks at Awcomin Marsh – phragmites dies off and native plants return.

UN-SPOILING THE ECOSYSTEM

At the Awcomin Marsh in Rye ongoing work focuses on removing spoils dredged from Rye Harbor in the 1940s and 1960s. The spoils – 8 feet thick in places – cover about 24 acres and prevent the tidal flow of salt water into the marsh.

In the early 1990s contractors partially restored about 12 acres of Awcomin Marsh by breaching dikes and digging ditches to replace the original tidal creeks filled by spoils.

Once adequate tidal flow is restored to a salt marsh, plugging the system of drainage ditches raises the water table, allowing twice daily flushing of these shallow pools. Over time, the man-made ditches will fill with sediment.

Without enough tidal flow, the salinity of salt marsh water decreases, allowing phragmites, purple loosestrife and other invasive plants to choke out native salt marsh species like cordgrass, salt meadow hay and glasswort.

The Little River Marsh is already conquering the exotic invaders. "The changeover is happening quite rapidly," Gordon said. "The loosestrife went very quickly. The (phragmites) will take a little longer."

Sometimes extra work is needed to root out phragmites. In projects between Barrington and Dover, the top layer of the marsh was shaved off to remove phragmites colonies, roots and all. Also, ditches were excavated to flood the area.

By gradually building up the soil, salt marshes also keep pace with rising sea levels. Over the last 6,000



ERIC ALDRICH PHOTOS

years, the Atlantic has risen several yards. Healthy marshes are expected to match a predicted one-foot increase in the next 100 years. By absorbing the brunt of pounding waves, salt marshes mitigate storm surges too. Winter storms are more damaging in places where salt marshes have been destroyed.

Future salt marsh restoration projects are planned for the Brown's River Salt Marsh in Seabrook, the Bass Beach Salt Marsh in Rye and the Philbrick's Pond Salt Marsh in North Hampton. ■



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